NOTES - *NOTISER*

Contribution to the mineralogy of Norway, No. 47

Three Minerals New to Norway: Wickmannite, Leadhillite and Hydrocerussite

REIDAR ÅMLI & WILLIAM L. GRIFFIN

Åmli, R. & Griffin, W. L.: Three minerals new to Norway: wickmannite, leadhillite and hydrocerussite. Contribution to the mineralogy of Norway, No. 47. *Norsk Geologisk Tidsskrift,* Vol. 52, pp. 193–196. Oslo 1972.

Wickmannite, leadhillite and hydrocerussite were identified from a nepheline-syenite pegmatite in Tvedalen (Heia quarry) near Larvik, southern Norway. The data for the Tvedalen wickmannite are in close agreement with those reported for the Långban type example. The occurrence of leadhillite and hydrocerussite in this environment is unusual.

R. Åmli, Mineralogisk-geologisk museum, Sars gate 1, Oslo 5, Norway.
W. L. Griffin, Institutt for geologi, Universitetet i Oslo, Blindern, Oslo 3, Norway.

The larvikite, one of the most abundant differentiates in the Oslo rock series, is intersected by numerous syenitic pegmatites. Wickmannite, leadhillite and hydrocerussite were found in one of the nepheline-syenite pegmatites in Tvedalen (Heia quarry) near Larvik, southern Norway.

All three minerals occur in a part of the pegmatite where solutions possibly of late magmatic origin have caused deposition of typical late minerals. The mineral association is as follows: Orthoclase, albite, aegirite, lepidomelane, zircon, apatite, hambergite, fluorite, analcite, natrolite, thomsonite, chlorite, arsenopyrite, loellingite, galena and wulfenite.

Wickmannite $MnSn(OH)_6$

Wickmannite was found in one specimen only, where it occurs as a poorly developed crystal approximately ½ mm across, closely associated with analcite, fluorite and a chlorite mineral. The colour when viewed under the binocular microscope is deep golden yellow.

Wickmannite apparently is an extremely rare mineral; it has previously been reported only from the skarn deposits at Långban, Sweden, where it occurs in trace amounts as small yellow octahedra (Moore & Smith 1968). At both Långban and Tvedalen, wickmannite appears to have formed late in the paragenetic sequence.

Table 1. X-ray powder data for wickmannite from Långban and Tvedalen.

Wickmannite Flink specimen No. 374 Långban Moore & Smith 1968		Wickmannite Tvedalen	
d(Å)	I	d(Å)	I
4.552	4	4.55	6
3.931	10	3.94	10
2.778	6	2.78	7
2.487	2	2.49	2
2.372	3	2.37	5
2.273	3	2.27	5
2.104	1	2.10	1
1.971	3½	1.96	5
1.806	2	1.80	2
1.7618	7	1.761	8
1.6080	5	1.608	7
1.5138	2	1.515	3
1.4038	2	1.393	2
1.3315	2	1.332	3
1.3130	3	1.312	4
1.2452	3	1.245	4
1.2000	1	1.202	1
1.1882	3	1.187	4
1.1364 (calc.)		1.137	1
1.1024 (calc.)		1.102	2
1.0929	2	1.092	3
1.0536	4	1.052	4
1.0268	3	1.025	4

Optical data. Wickmannite from Tvedalen is optically isotropic, with n_{Na} = 1.698 ± 0.004. The larger splinters show a pale yellow color. The Långban wickmannite has n = 1.705 ± 0.003 (white light).

X-ray powder data. A Debye-Scherrer camera with Mn-filtered Fe-radiation was used. Intensities are visually estimated.

Chemistry. Two small fragments of the wickmannite grain were placed on an epoxy-coated glass slide so that cleavage faces were roughly horizontal. The slide was coated with carbon and the grains examined using an ARL-EMX microprobe at the Physics Institute of the Norwegian Technical University, Trondheim. Wavelength scans showed the major cations to be Sn and Mn. Ca, Fe, Sb and Nb are present at the O.x wt. % level; each was identified by several spectral lines. The following elements were sought for but not found (< 0.1%): F, Mg, Al, Si, P, K, Ti, Zn, Zr, Mo and Pb.

The count rates of Sn and Mn rose steadily with time if the focused beam (< 0.5 μ) was left on one spot, suggesting that the mineral contains $(OH)^{-1}$ or another volatile radical which was driven off by the heat of the beam.

Table 2. Analysis of wickmannite from Långban and Tvedalen.

Element wt. %	Wickmannite Flink specimen No. 374 Långban	Wickmannite Tvedalen
Sn	47.2	47
Mn	16.6	21
Mg	0.3	0.0
Ca	0.2	~ 0.1
Fe	0.1	~ 0.3
Sb	Tr	~ 0.1
Nb	Tr	~ 0.1
Si	Tr	0.0

The rough, non-horizontal surface and the destruction of the sample by the beam prevented a quantitative analysis, but a semiquantitative analysis was attempted using pure standards and operating conditions of 15 kV accelerating voltage, 0.1 μ amp. sample current (on pure Sn). The data were corrected for absorption and fluorescence using the Springer correction program and assuming the presence of 6 (OH) groups.

The analysis and comparable figures from the Långban occurrence are given in Table 2.

The Sn and Mn values for the Tvedalen wickmannite are probably maxima, due to the dehydration mentioned above, and to a tendency for the Springer program to overcorrect in the presence of light elements. The analytical total, including the assumed OH content, is 106%. A high total was also obtained by Moore & Smith (1968), but was ascribed to uncertainties in the correction procedure. The similarity of the analyses is, however, close enough to confirm the identification of the mineral as wickmannite.

Leadhillite $Pb_4[(OH)_2|SO_4|(CO_3)_2]$

Leadhillite was discovered in a cavity in a corroded rough galena crystal, indicating its mode of formation to be the same as for leadhillite in its characteristic environment, the oxidized zone of lead deposits.

It occurs as a small (~ 1 mm) anhedral grain. It is partly translucent and has a grayish colour.

The identity was established from the X-ray powder data.

Hydrocerussite $Pb_3[OH|CO_3]_2$

Only a very tiny amount of this mineral was found. It occurs as small (~ 1/25 mm) white crystals encrusting part of the leadhillite.

Also hydrocerussite is a typical alteration product of galena in the oxidized zone of lead deposits.

The identity was established from the X-ray powder data.

Acknowledgements. – We thank B. Tøtdal (Physics Institute of the Norwegian Technical University) for assistance in reduction of the probe data, and H. Annersten (Geological Institute, University of Uppsala) for checking fluorine.

April 1971

REFERENCE

Moore, P. B. & Smith, J. V. 1968: Wickmannite, $Mn^{+2}[Sn^{+4}(OH)_6]$ a new mineral from Långban. *Arkiv Mineral. Geol. 4,* No. 16, 395–399.